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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/684,522	10/15/2003	Young-Dong Lee	030681-578	4190

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EXAMINER
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ALEJANDRO MULERO, LUZ L

ART UNIT	PAPER NUMBER
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1763

DATE MAILED: 11/16/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/684,522

Applicant(s)

LEE ET AL.

Examiner

Luz L. Alejandro

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 21 October 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-24 is/are pending in the application.
- 4a) Of the above claim(s) 4-8 and 22-24 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-3 and 9-21 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 1003, 1204, 0505.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Election/Restrictions***

Applicant's election of specie A, claims 1-3 and 9-21, in the reply filed on 10/21/05 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

Claims 4-8 and 22-24 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-3, 9-12, and 19-21 are rejected under 35 U.S.C. 102(e) as being anticipated by Kwon et al., U.S. Patent 6,653,988.

Kwon et al. shows the invention as claimed including an inductively coupled plasma generating apparatus comprising: an evacuated reaction chamber; an antenna installed at an upper portion of the reaction chamber to induce an electric field for

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ionizing reaction gas supplied into the reaction chamber and generating plasma; and an radio frequency power source connected to the antenna to apply radio frequency power to the antenna, wherein the antenna comprises a plurality of coils having different radiuses, at least one of the coils being a serpentine coil bent in a zigzag pattern (see fig. 2A and its description).

With respect to claim 2, the antenna comprises a circular coil arranged at a center portion of the antenna 130 and a serpentine coil arranged around and connected to the circular coil (see center portion 140).

Concerning claim 3, the circular coil has a relatively small radius to reduce the area of opposing portions between the circular coil and the serpentine coil.

Regarding claim 9, the serpentine coil has a zigzag pattern with equally spaced interval sections.

With respect to claims 11-12, the inner and outer portions of the serpentine coil are arranged to correspond to center and edge portions of the chamber, respectively, and the plurality of coils are connected by connection coils that are placed high above a plane where the plurality of coils are arranged.

Concerning claims 19-21, the apparatus further comprises: a matching network connected between the radio frequency power source and the antenna; and a capacitor C3 connected between the matching network and the antenna, in parallel with the antenna, wherein the plurality of coils are connected in series to the radio frequency power source, and wherein at least one of the coils is connected in parallel to the radio frequency power source.

Claims 1-3 and 9-12 rejected under 35 U.S.C. 102(e) as being anticipated by Wang et al., US 2003/0111181.

Wang et al. shows the invention as claimed including an inductively coupled plasma generating apparatus comprising: an evacuated reaction chamber; an antenna installed at an upper portion of the reaction chamber to induce an electric field for ionizing reaction gas supplied into the reaction chamber and generating plasma; and an radio frequency power source connected to the antenna to apply radio frequency power to the antenna, wherein the antenna comprises a plurality of coils having different radiuses (910,920,930), at least one of the coils being a serpentine coil bent in a zigzag pattern (see figs. 1-2 and 9 and their descriptions—note that the coils of fig. 9 can be replaced by one of the coils of figs. 1-2).

With respect to claim 2, the antenna comprises a circular coil arranged at a center portion of the antenna and a serpentine coil arranged around and connected to the circular coil.

Concerning claim 3, the circular coil has a relatively small radius to reduce the area of opposing portions between the circular coil and the serpentine coil.

Regarding claim 9, the serpentine coil has a zigzag pattern with equally spaced interval sections.

With respect to claims 11-12, the inner and outer portions of the serpentine coil are arranged to correspond to center and edge portions of the chamber, respectively,

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and the plurality of coils are connected by connection coils that are placed high above a plane where the plurality of coils are arranged.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 13-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kwon et al., U.S. Patent 6,653,988.

Kwon et al. is applied as above but do not expressly disclose the particular shape of the coils. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Kwon et al. as to have the coil in the desired shape because the configuration of the claimed coils is a matter of choice which a person of ordinary skill in the art would have found obvious absent persuasive evidence that the particular configuration of the claimed coils is significant.

Claims 15-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kwon et al., U.S. Patent 6,653,988 in view of Hemker et al., US 2004/0011467 or Bailey, III et al., US 2003/0010454.

Kwon et al. is applied as above but do not expressly disclose the claimed magnetic configuration. Hemker et al. discloses a plurality of permanent magnets 132

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arranged around the outer wall of the reaction chamber, wherein their north and south poles alternate, they are arranged in a region where the magnitude of a magnetic field generated by the antenna is relatively weak, and the magnets can revolve simultaneously about a central axis of the reaction chamber to shift their positions (see figs. 1-6c and their descriptions). Alternatively, Bailey, III et al. also discloses the claimed structure (see figs. 2, 3A-4, and 6 and their descriptions). In view of these disclosures, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Kwon et al. so as to include the magnetic structure of Hemker et al. or Bailey, III et al. because such a magnetic configuration allows for modification of the plasma as well as allowing the plasma to be better confined to the processing region.

Claims 13-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang et al., US 2003/0111181.

Wang et al. is applied as above but do not expressly disclose the particular shape of the coils. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Wang et al. as to have the coil in the desired shape because the configuration of the claimed coils is a matter of choice which a person of ordinary skill in the art would have found obvious absent persuasive evidence that the particular configuration of the claimed coils is significant.

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Claims 15-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang et al., US 2003/0111181 in view of Hemker et al., US 2004/0011467 or Bailey, III et al., US 2003/0010454.

Wang et al. is applied as above but do not expressly disclose the claimed magnetic configuration. Hemker et al. discloses a plurality of permanent magnets 132 arranged around the outer wall of the reaction chamber, wherein their north and south poles alternate, they are arranged in a region where the magnitude of a magnetic field generated by the antenna is relatively weak, and the magnets can revolve simultaneously about a central axis of the reaction chamber to shift their positions (see figs. 1-6c and their descriptions). Alternatively, Bailey, III et al. also discloses the claimed structure (see figs. 2, 3A-4, and 6 and their descriptions). In view of these disclosures, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Wang et al. so as to include the magnetic structure of Hemker et al. or Bailey, III et al. because such a magnetic configuration allows for modification of the plasma as well as allowing the plasma to be better confined to the processing region.

Claims 19-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang et al., US 2003/0111181 as applied to claims 1-3 and 9-12 above, and further in view of Kwon et al., U.S. Patent 6,653,988.

Wang et al. is applied as above but does not expressly disclose a capacitor connected between the matching network and the antenna, in parallel with the antenna,



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wherein the plurality of coils are connected in series to the radio frequency power source, and wherein at least one of the coils is connected in parallel to the RF source. Kwon et al. discloses a capacitor C3 connected between the matching network 120 and the antenna, in parallel with the other branch from the power supply connecting with the antenna, wherein the plurality of coils are connected in series to the radio frequency power source 110, and wherein at least one of the coils is connected in parallel to the RF source (see fig. 2a and its description). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Wang et al. so as to include the antenna configuration of Kwon et al. because in such a way a suitable parallel resonance antenna can be operated.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Luz L. Alejandro whose telephone number is 571-272-1430. The examiner can normally be reached on Monday to Thursday from 7:30 to 6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on 571-272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Luz L. Alejandro  
Primary Examiner  
Art Unit 1763

November 14, 2005